



The Informed Arizona Equestrian HORSE HEALTH SERIES

Ionophore Toxicity in Horses

S. Peder Cuneo, DVM, Elizabeth A. Greene, Ph.D., Ashley D. Wright, M.S.

Scenario: Your grandpa decides to give you a treat by purchasing horse feed for your two show horses. But, when he gets to the feed store, he finds out that your brand of feed is very expensive. He used a similar type mix for his cattle at about half the price, so he picks that up instead. He empties it into the large feed bin and heads home. The next morning, one horse is dead and the other is showing severe colic signs.

Ionophores are a class of antibiotics labeled for use in cattle, small ruminant, and poultry feed to slow the growth of intestinal coccidia and improve feed efficiency. While antibiotics fed to animals that are considered important for human health are now regulated under the Veterinary Feed Directive (VFD), and require the equivalent of a prescription from a veterinarian; ionophores are not used in humans and therefore, are not included under this rule. They may be purchased “over the counter” from any feed supplier. Commonly used products (and some brand names) include monensin (Coban, Rumensin), lasalocid (Bovatec), and salinomycin (Biocox, Saccox). Ionophores are absorbed in the digestive tract and when toxic amounts are ingested, the heart, skeletal muscle, and also the kidney and liver can be negatively affected. Horses are very susceptible to ionophore toxicity; the lethal dose is less than 1/10th of the amount that can be safely fed to cattle. For monensin, 2-3 mg/kg, or about 1 gram, is enough to poison a 1,000 lb. horse. For salinomycin, that amount decreases to 0.6mg/kg. Even a very small amount of an ionophore is enough to kill your horse.

Is my horse at risk?

Horses are usually exposed to ionophores by gaining access to medicated feed intended for cattle or poultry. This could be by unknowingly purchasing a product containing ionophores which is not intended for horses, or allowing ranch horses to eat with the cattle. Be sure to read all feed labels carefully. If ionophores are being fed to other animals on the property, take precautions to ensure horses cannot gain access to the feed or are not accidentally fed the medicated feed. Even exposure to poultry waste containing ionophores can cause issues with horses.

Signs of Ionophore Toxicity

Severity and speed of onset of clinical signs depends on how much they ingest. Horses with a common feed source can be affected simultaneously.

- Sudden death
- Exercise intolerance
- Feed refusal
- Colic
- Increased heart/respiratory distress
- Hypotensive shock.

Note: If the horse survives, it will likely have some level of permanent damage to heart muscle, possibly leading to poor performance and congestive heart failure.

On occasion, mistakes in mixing or cleaning protocols at feed mills have happened, resulting in distribution of horse feed tainted with ionophores. These occurrences are rare, and reputable feed mills have protocols in place, which may even include separate equipment or facilities, to ensure this does not happen. The U.S. Food and Drug Administration introduced specific rules in 2011 to establish CGMP's (Current Good Manufacturing Practices) and preventative controls for animal feed manufacturers. These animal feed regulations should decrease potential of feed mill errors.

Treatment

There is not a specific drug to reverse ionophore poisoning, but supportive care may help, depending on severity. This includes emptying the gastrointestinal tract by treating with mineral oil and activated charcoal, and using IV fluids to support heart output. Serious cases may require extensive nursing care including heart monitoring and antiarrhythmic drugs.

Prevention

Ionophore toxicity is a result of ingestion of the compound. Therefore, do not allow your horse to have any access to feed prepared for use in cattle, small ruminants, or poultry. Read feed bag labels carefully, if any ionophores have been added, the product and amount will be on the label. Do not buy or use “damaged” bagged feeds that don’t have a label. These feeds may be discounted, but the cost may end up being your horse’s life. If the toxicity is the result of errors from the feed manufacturer, there may be extensive legal implications for that company.

You should always maintain good records of feed provided to your horse, including labels and lot numbers. This will be valuable information in the case of a recall or suspected poisoning. Simply tearing off the entire label (including the lot number), marking it with the date you opened the bag, and placing it in your filing cabinet is one easy way to keep track of this information.

Cattle Feed Label Examples

Note that the drug **monensin** has been clearly marked on the labels below. These labels also include a “Caution” statement against feeding this feed to horses, however not all ionophore feed labels carry this warning. These example feed labels are courtesy of the University of Arizona Feedlot and Brice Tabor.

BULK OR BAGGED NET WT. 50 # (22.68 kg.)
 U OF A
FEEDLOT SUPPLEMENT
 1/1/09 W/RUMENSIN / TYLAN
 CODE # UA-1219RT
MEDICATED
 For reduction of incidence of liver abscesses caused by Fusobacterium necrophorum and Corynebacterium. And increased rate of gain and improved feed efficiency.

DRUG INGREDIENT
 Monensin (as Monensin Sodium) 120,159.1 Gm/ton - 640.79 Mg/lb ... Monensin.
 Tylosin 377.6 Gm/ton - 188.8 Mg/lb..... Tylosin

GUARANTEED ANALYSIS

Crude Protein min.	10.00%
(This includes not more than 10% equivalent crude protein from non-protein nitrogen)	
Crude Fiber max.	10.00%
Calcium min.	15.00%
Calcium max.	19.50%
Salt min.	10.00%
Salt max.	12.50%
Vitamin, A min.	36,000.00iu/Lb.
Vitamin, E min.	100.00iu/Lb.

INGREDIENTS
 Calcium Carbonate, Processed Grain, Sodium Chloride, Ammonium Sulfate, Potassium Chloride, Dicalcium Phosphate, Molasses, Magnesium Oxide, Zinc Sulfate, Magnesium Oxide, Ferrous Carbonate, Molasses, Copper Sulfate, Manganese Sulfate, Ferrous Sulfate, Sodium Selenite, Potassium Iodide, Cobalt Carbonate, Vitamin A Acetate, and Vitamin E Supplement.

CAUTION
CAUTION: USE AS DIRECTED. FOR RUMINANTS ONLY CONTAINS COPPER DO NOT FEED TO SHEEP OR RELATED SPECIES.

FEEDING DIRECTIONS
 Feed according to formulating Nutritionists instructions. Do not feed undiluted, feed at the rate of 0.43 lb per head per day into a TMR to feeder cattle to provide 275.54 mg day of Monensin and 81.134 mg day of Tylosin. Quality roughage should be available at all time, with an unlimited source of clean water.

CAUTION
 Do not allow Horses or other Equines access to feeds containing Monensin. Ingestion of Monensin by equines has been fatal. Monensin medicated feed is safe for use in cattle only. Consumption by unapproved species may result in toxic reactions. Do not feed undiluted or mixing errors resulting in high concentrations of Monensin has been fatal to cattle. If feed refusals containing monensin are fed to other groups of cattle, the concentration of Monensin in the refusals and amount of refusals fed should be taken into consideration to prevent monensin overdosing. Must be thoroughly mixed in prevent monensin overdosing. A withdrawal time has not been established for pre-ruminating calves. Do not use in calves to be processed for veal.

MANUFACTURED BY
 MAID RITE FEEDS,
 WILLCOX, AZ. 85643
 PHONE # 520-384-4688

10/30/14

BEEF STARTER W/RUM 25G/T
 For Beef Cattle In A Feedlot

MEDICATED
 For the prevention and control of coccidiosis due to Eimeria zuernii in calves (excluding veal calves).

ACTIVE DRUG INGREDIENT
 Monensin (as Monensin sodium)..... 25 g/ton

Guaranteed Analysis

Crude Protein (Min).....	12.0	%
Crude Fat (Min).....	1.5	%
Crude Fiber (Max).....	20.0	%
Calcium (Min).....	0.6	%
Calcium (Max).....	1.1	%
Phosphorus (Min).....	0.6	%
Salt (Min).....	0.2	%
Salt (Max).....	0.7	%
Potassium (Min).....	1.1	%
Vitamin A (Min).....	4,000	iu/lb

INGREDIENTS
 Processed Grain By-Products, Roughage Products, Grain Products, Molasses Products, Rice Mill Feed, Calcium Carbonate, Salt, Potassium Chloride, Propionic Acid, Sulfuric Acid, Sorbic Acid, Benzoic Acid, Ammonium Hydroxide, Calcium Propionate, Calcium Bentonite, Vermiculite, Vitamin A Supplement, Sodium Saccharin, Dextrose, Natural and Artificial Flavors, Silicon Dioxide, Basic Copper Chloride, Magnesium Oxide, Manganese Sulfate, Zinc Sulfate, Cobalt Sulfate, Ethylene diamine Dihydrochloride, Ferrous Carbonate, Sodium Selenite, Vitamin E Supplement.

FEEDING DIRECTIONS
 Feed this product to provide monensin at 0.14-0.12mg/lb. of bodyweight per day depending on the severity of the challenge up to a maximum of 360mg/head/day.

CAUTION: Do not allow horses or other equines access to formulation containing Monensin. Ingestion of Monensin by equines has been fatal. Monensin medicated cattle and goat feeds are safe for use in cattle and goats only. Consumption by unapproved species may result in toxic reactions. Do not exceed the levels of Monensin recommended in the feeding directions, as reduced average daily gains may result.

CAUTION: THIS FEED CONTAINS ADDED COPPER. DO NOT FEED TO SHEEP OR RELATED SPECIES.

Provide fresh, clean water at all times. Keep feed fresh in cool, dry storage. DO NOT use feed that is old, moldy or insect contaminated.

WARNING: A WITHDRAWAL TIME HAS NOT BEEN ESTABLISHED FOR PRE-RUMINATING CALVES. DO NOT USE IN CALVES TO BE PROCESSED FOR VEAL.

Provide fresh, clean water at all times. Keep feed fresh in cool, dry storage. DO NOT use feed that is old, moldy or insect contaminated.

Manufactured By:
 BLUE BIRD FEEDS
 123 OLD MILL ROAD
 Anytown, AZ 12345
 50 lbs (22.6 Kg)

References and Further Reading

- Buckeye Nutrition. (2017 July). Deady Consequences: Is Your Horse Feed Safe? *Horsemen's Corral*. Retrieved from <http://pubs.royle.com/article/Deadly+Consequences%3A+Is+Your+Horse+Feed+Safe%3F/2818971/419613/article.html>
- Gioja, J. (2006 November). Toxicology Brief: "Ionophore Toxicosis in Horses". *Vet Folio*. Retrieved From <http://www.vetfolio.com/toxicology/toxicology-brief-ionophore-toxicosis-in-horses>
- House, A. M. (n.d.). Monensin and Lasalocid Toxicity in Horses. *University of Florida College of Veterinary Medicine and Institute of Food and Agricultural Sciences Extension*. Retrieved from <http://nwdistrict.ifas.ufl.edu/phag/files/2015/02/Monensin-and-Lasalocid-Toxicity-in-Horses.pdf>
- Ionophore Intoxication in Horses. (2012, March 21). *The Horse*. Retrieved from <http://www.thehorse.com/articles/28868/ionophore-intoxication-in-horses>
- Raia, P. (2015, April 1). Is My Horse's Feed Safe? *The Horse*. Retrieved from <http://www.thehorse.com/articles/35570/is-my-horses-feed-safe>
- Wright, A., Faulkner, D., & Cuneo, P. (June 2016). Veterinary Feed Directive Changes for Arizona Livestock Producers. *University of Arizona Cooperative Extension Publication*. Az1705. Retrieved from <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1705-2016.pdf>



THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES

Cooperative Extension

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721

S. PEDER CUNEO, DVM
Extension Veterinarian

ELIZABETH A. "BETSY" GREENE, PH.D.
Professor/Extension Horse Specialist

ASHLEY D. WRIGHT, MS
Livestock Area Agent

CONTACT:
BETSY GREENE
betsygreene@email.arizona.edu

This information has been reviewed
by University faculty.
extension.arizona.edu/pubs/az1758-2018.pdf

Other titles from Arizona Cooperative Extension
can be found at:
extension.arizona.edu/pubs

Any products, services or organizations that are mentioned, shown or indirectly implied in this publication do not imply endorsement by The University of Arizona.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation in its programs and activities.